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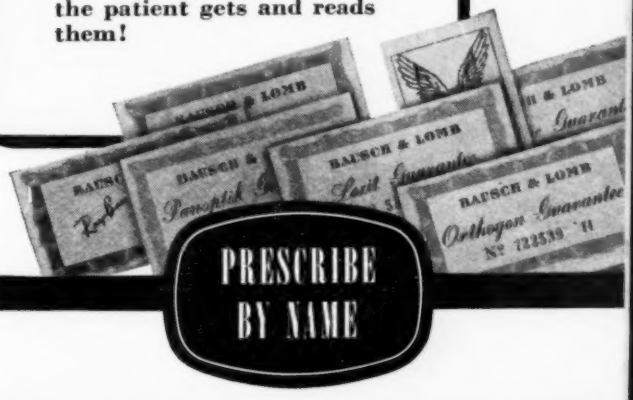

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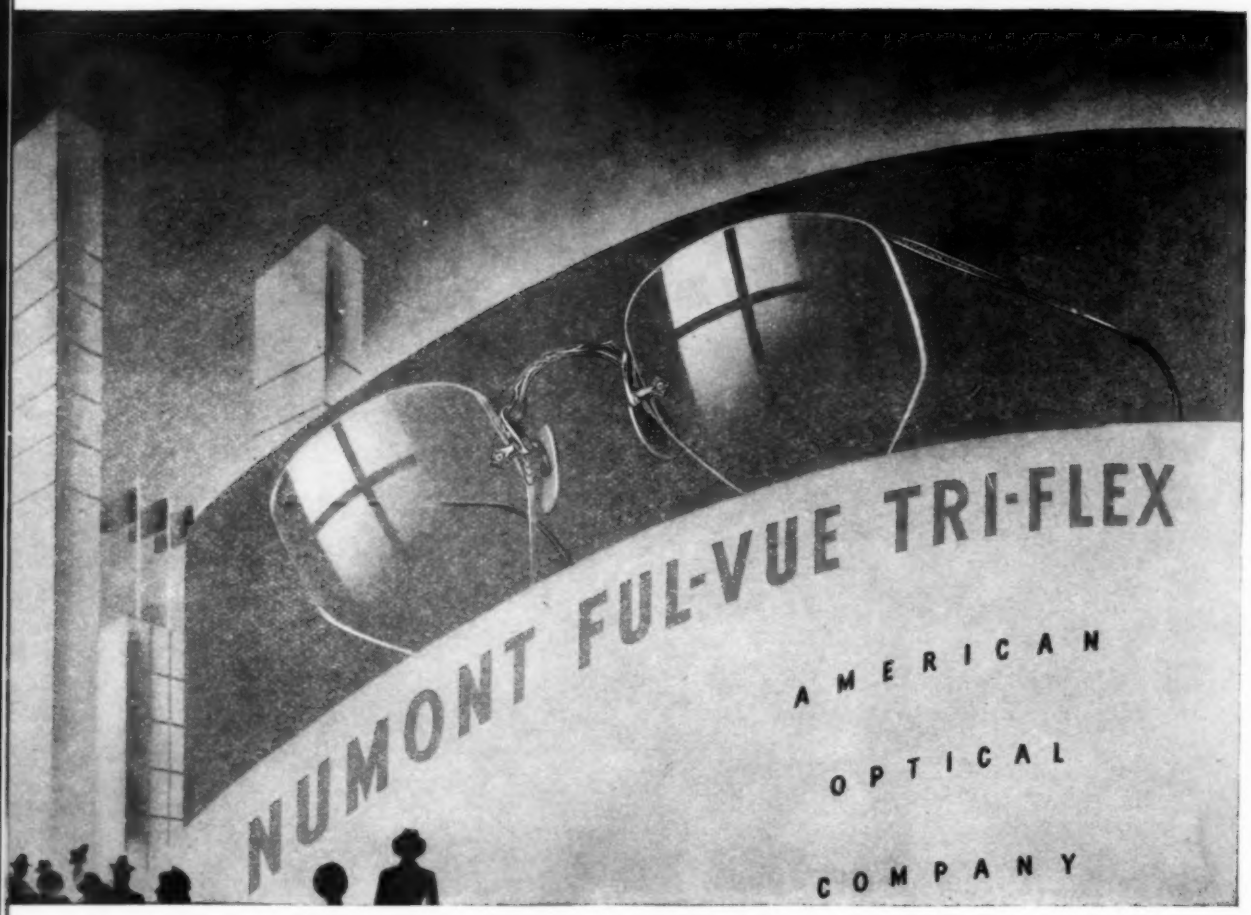

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Vol. 16 NOVEMBER, 1939 No. 11

THE RELATION OF THE KERATOMETRIC FINDINGS TO THE TOTAL ASTIGMATISM OF THE EYE*

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The astigmatism measured by the keratometer is often referred to as corneal astigmatism, but yet it is a mistake to identify the two, because the keratometer measurement is based upon the toroidal shape of the cornea and does not take into consideration the astigmatism produced by the obliquity of the line of sight. Furthermore, the keratometer measurement is based upon the reflection of light at four small spots on the cornea, and the curvature measured in this way does not necessarily represent an average of the region of the cornea through which light from the point of fixation must pass on its way to the pupil. It is better, therefore, to designate the astigmatism measured by the keratometer as keratometric rather than corneal.

The astigmatism measured with trial lenses and a skiascope, or a fan dial is designated as the total astigmatism of the eye. At least it can be said, that this represents the total astigmatism of the eye in the plane of the spectacles. Once the astigmatism is measured in the plane of the spectacles, it can be computed in the plane of the cornea, and then can be designated as the total astigmatism of the eye in the plane of the cornea.

In the present investigation, 100 subjects (200 eyes) were examined with the keratometer and with the fan dial, in order to determine the relationship between the keratometric astigmatism and the total astigmatism at the cornea. Sixty of the subjects were taken from the practice of Ryer and Hotaling of New York City, and 40 from that of the senior author.

The power of the cylinder which will correct the total astigmatism

*Submitted for publication August 16, 1939.

when placed in contact with the cornea can be computed from the sphere and cylinder in the subjective finding by the following formula,

$$\frac{1}{\frac{1}{Dc + Ds} - d} - \frac{1}{\frac{1}{Ds} - d} = Dec,$$

in which Dec = the effective cylinder power at the cornea and therefore represents the correction for the total astigmatism at the cornea,

Dc = the power of the cylinder in the subjective finding,

Ds = the power of the sphere in the subjective finding, and

d = the distance from the correcting lens to the cornea.

In this investigation d has been regarded as fixed at .014 meters, and the combination of lenses before each eye in the subjective test has been regarded as equivalent to a single thin lens. In order to facilitate the determination of the total astigmatism at the cornea, the graph in Fig. I has been employed.

Figure 1.

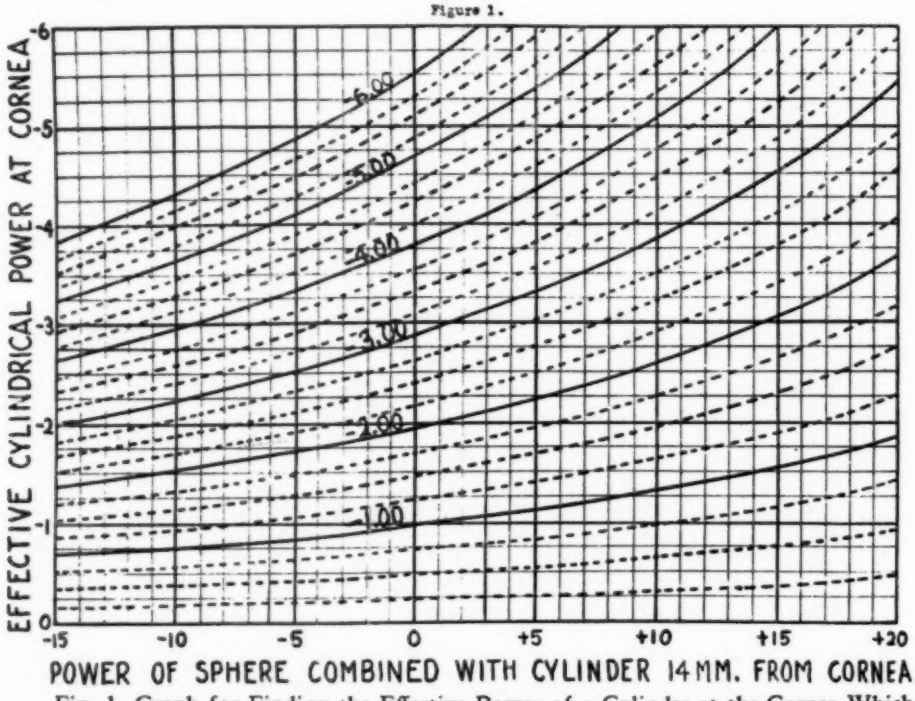

Fig. 1. Graph for Finding the Effective Power of a Cylinder at the Cornea Which is Combined with a Sphere 14 mm. from the Cornea. The curves represent the power of the cylinder combined with a sphere 14 mm. from the cornea.

In order to avoid the problem of comparing cases of astigmatism with axes in various meridians, all the eyes used in this investigation have been selected with the principal meridians of the keratometric astigmatism at, or within 10° of, 180° and 90°. In all of the cases in-

Figure 2.

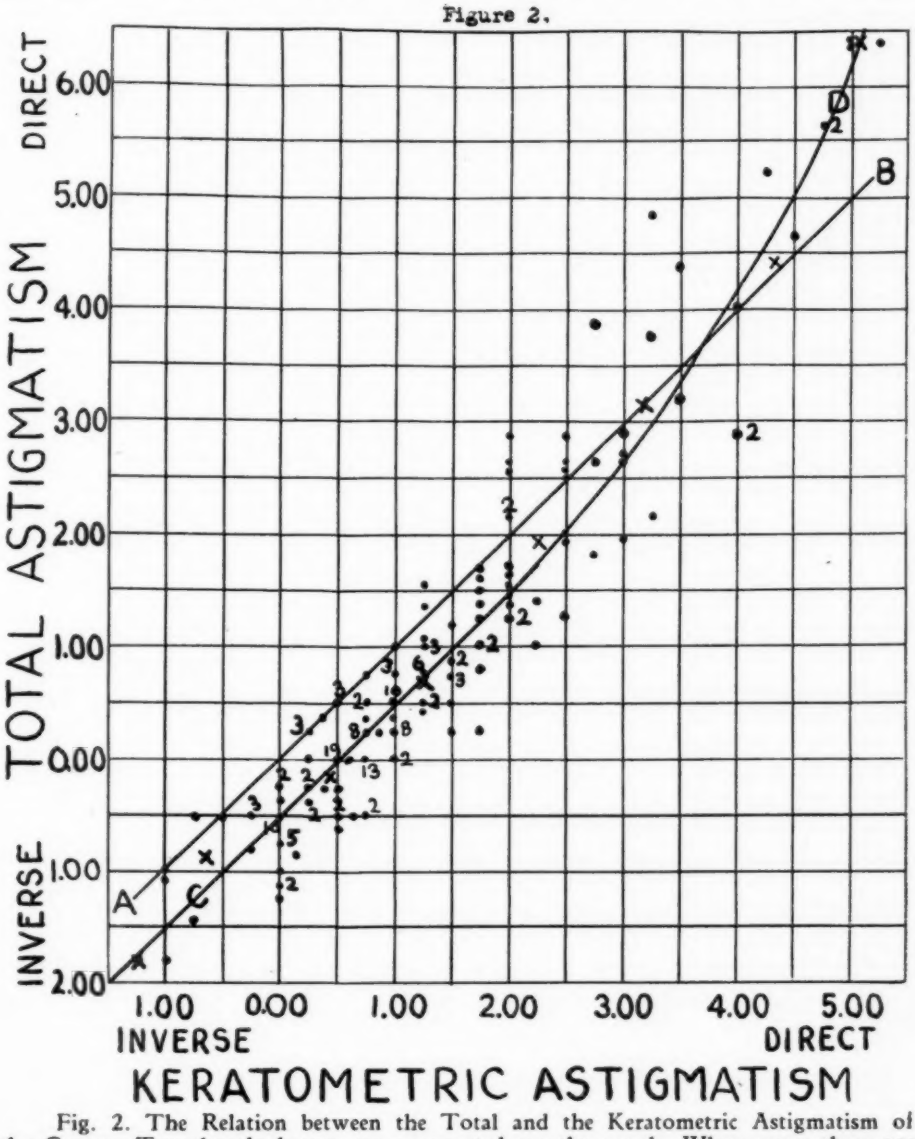

Fig. 2. The Relation between the Total and the Keratometric Astigmatism of the Cornea. Two hundred eyes are represented on the graph. When more than one eye falls at the same point, the number is indicated above or to one side of the point. The crosses represent statistical averages of the groups classified in Table I.

cluded, the axes of the total astigmatism fell within 10° of 90° or 180° except in 5 eyes in which the discrepancy was 15°, 3 eyes in which it was 20°, and 1 eye in which is was 30°. In the following analysis of the data, all measures of astigmatism have been classified arbitrarily as direct or inverse,[1] and the deviations of the axes from 90° and 180° have been disregarded.

In Fig. 2, the total astigmatism at the cornea is plotted against the keratometric astigmatism for the 200 eyes. For the purpose of computing statistical averages, eyes showing various amounts of keratometric astigmatism were grouped together as shown in Table 1. The average values for keratometric astigmatism and the total astigmatism for the eyes in each group are also shown in Table I and are indicated by the crosses in Fig. 2. The curve CD fits approximately the average values. The line AB represents the eyes in which the total astigmatism is equal to the keratometric astigmatism. For values of keratometric astigmatism between 2.00 diopters inverse and 2.00 diopters direct, the average discrepancy between the keratometric astigmatism and the total astigmatism at the cornea can be regarded as constant at .50 diopters. When the keratometric astigmatism goes above 2.00 diopters direct, the total astigmatism at the cornea approaches the keratometric astigmatism and finally exceeds it.

TABLE I.

Average Values of Keratometric, Total and Non-Keratometric Astigmatism for Subjects Grouped According to Various Values of Keratometric Astigmatism

Grouping of Subjects According to Keratometric Astigmatism	No. of Eyes	Av. Value of Keratometric Astigmatism	Av. Value of Total Astigmatism	Av. Value of Non-Keratometric Astigmatism
2.00-1.01 Inverse	1	1.25 Inverse	1.81 Inverse	.56 Inverse
1.00- .01 Inverse	10	.60 Inverse	.85 Inverse	.25 Inverse
0 - .99 Direct	89	.43 Direct	.14 Inverse	.57 Inverse
1.00-1.99 Direct	57	1.25 Direct	.70 Direct	.55 Inverse
2.00-2.99 Direct	24	2.26 Direct	1.92 Direct	.34 Inverse
3.00-3.99 Direct	9	3.19 Direct	3.17 Direct	.02 Inverse
4.00-4.99 Direct	7	4.32 Direct	4.40 Direct	.08 Direct
5.00-5.99 Direct	3	5.08 Direct	6.38 Direct	1.30 Direct

[1]When the meridian of greatest refraction is vertical, the astigmatism is designated as direct (or with the rule), and when it is horizontal, the astigmatism is designated as inverse (or against the rule).

Although it is possible to determine a relationship between keratometric astigmatism and total astigmatism, which is based on statistical averages, it cannot be assumed that this relationship will hold in an individual case and if this relationship were used as a basis for predicting the total astigmatism from the keratometer findings, errors as large as 1.75 diopters would be expected to occur.

The amount of astigmatism which must be combined with the keratometric astigmatism in order to make it equal, necessitates that the total astigmatism at the cornea be designated as the non-keratometric astigmatism. For each of the groups of eyes in Table I, the average value for non-keratometric astigmatism has been calculated and is shown in the table. When the keratometric astigmatism is against the rule or less than 2.00 D. with the rule, the non-keratometric astigmatism remains practically constant at about .50 diopters, but shows a shift toward with the rule, when the keratometric astigmatism is greater than 2.00 diopters with the rule.

TABLE II.

Average Values of Keratometric Astigmatism for Various Age Groups

Age	No. of Eyes	Av. Keratometric Astigmatism
5- 9	2	.75 Direct
10-14	6	.54 Direct
15-19	6	2.37 Direct
20-24	22	.96 Direct
25-29	26	1.11 Direct
30-34	34	1.07 Direct
35-39	10	.81 Direct
40-44	20	1.13 Direct
45-49	28	1.21 Direct
50-54	22	1.76 Direct
55-59	20	1.18 Direct
60-64	None	
65-69	2	0
70-74	None	
75-79	2	1.12 Inverse

Inasmuch as other writers have alleged that this non-keratometric astigmatism varies with age [2,3], it was deemed desirable to undertake an investigation of the relationship of the non-keratometric astigmatism to age.

As a preliminary step in this investigation, the 200 eyes were classified according to the age groups shown in Table II and average values for non-keratometric astigmatism were computed. This was found to vary considerably from one age group to another as shown in Table II. As already shown, the non-keratometric astigmatism varies with the keratometric. In order to prevent the variations in keratometric astigmatism with age, from affecting the correlation between non-keratometric astigmatism and age, the eyes used in this part of the investigation were limited to 146 with keratometric astigmatism ranging from 0 to 1.99 with the rule. These eyes were grouped according to age as shown in Table III and average values for non-keratometric astigmatism were calculated for the various age groups. The results show no regular or significant variation with age.

TABLE III.

Average Values for Non-Keratometric Astigmatism for Various Age Groups in 146 Eyes with Keratometric Astigmatism Ranging from 0 to 1.99 Diopters with the Rule.

Age	No. of Eyes	Av. Non-Keratometric Astigmatism
5-9	2	.75 Inverse
10-14	4	.83 Inverse
15-19	2	.62 Inverse
20-24	19	.50 Inverse
25-29	20	.50 Inverse
30-34	27	.45 Inverse
35-39	7	.45 Inverse
40-44	18	.70 Inverse
45-49	20	.60 Inverse
50-54	12	.44 Inverse
55-59	13	.77 Inverse
60-64	None	
65-69	2	.62 Inverse

[2]Charles Sheard, American Encyclopedia of Ophthalmology, 13, 9864 (1918).
[3]J. Neumueller, "Correction of Astigmatism," Publication of the Bureau of Visual Science of the American Optical Company.

Another fact of importance in regard to non-keratometric astigmatism is that it tends to be equal in the two eyes of each subject. This was demonstrated by plotting the non-keratometric astigmatism of the left eye against the non-keratometric astigmatism of the right eye as shown in Fig. 3. In only three cases did the non-keratometric astigmatism of one eye vary from that of its mate by more than .50 diopters, although the values for non-keratometric astigmatism range from 1.65 diopters with the rule to 1.50 diopters against the rule.

Figure 3.

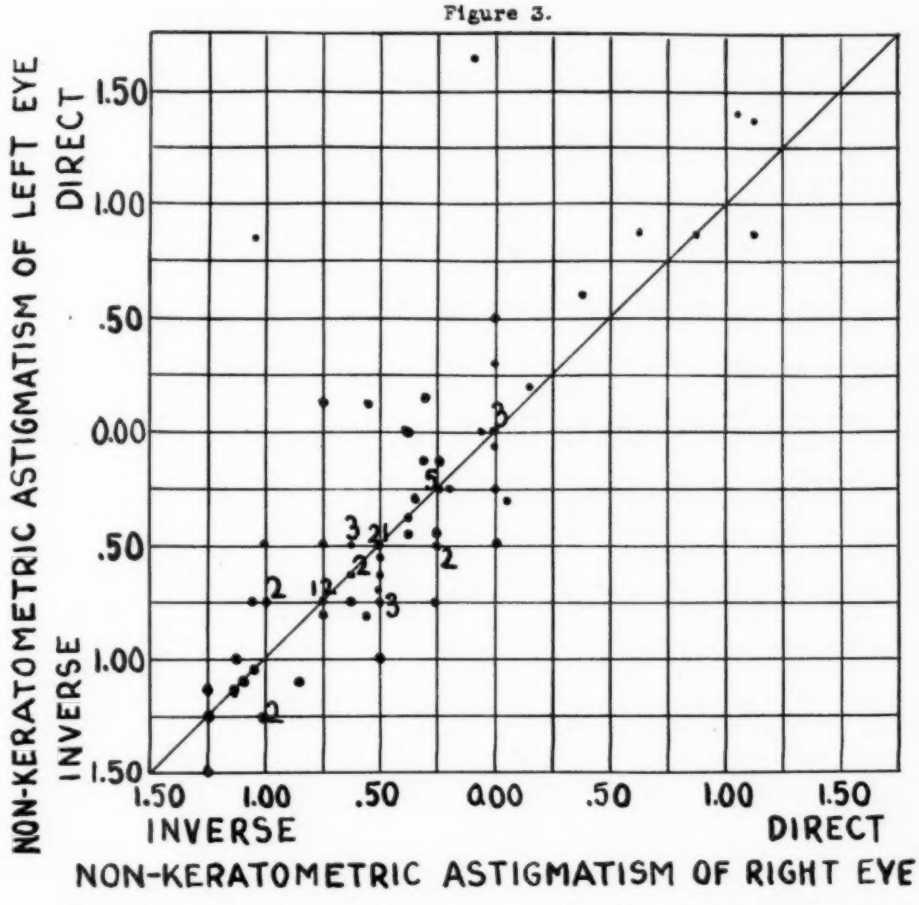

Fig. 3. The Correlation between the Values of Non-Keratometric Astigmatism of the Two Eyes.

A number of different factors can contribute to the discrepancy between the keratometric astigmatism and the total astigmatism which may be enumerated as follows:

1. Toroidal curvature of the anterior and posterior surface of the crystalline lens.
2. Toroidal curvature of the posterior surface of the cornea.
3. Obliquity of incidence at the various surfaces of the bundle of rays passing into the eye from the point of fixation.
4. An irregularity in curvature of the cornea which would make it impossible to obtain a measurement with the keratometer, which represents an average for that part of the cornea through which a beam of light from the point of fixation must pass on its way to the pupil.

It is hoped that subsequent investigations will make it possible to determine the relative contributions which these factors make to the discrepancy between the keratometric and total astigmatism of the eye.

DRS. H. G. MOTE AND G. A. FRY
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OHIO STATE UNIVERSITY
COLUMBUS, OHIO

RED AND BLUE FITOVERS FOR USE BY PATIENTS IN HOME TRAINING*

Harris Gruman, B.S., O.D., D.O.S.
Lebanon, Pa.

Those who treat amblyopias and squints have in their offices diverse instruments for teaching binocular vision and simultaneous macular perception. Each man has his own favorite armamentarium to force fusion and coordination of the eyes, but when most of the exercises and treatments are to be taken by the patient himself in his own home, the question arises as to the best and most economical means to use for such purposes.

In our office, besides the time-honored stereoscope with its diversity of fusion cards, we have long found it desirable to give the patient some form of exercise that would train coordination of the eye and hand. And for this purpose we have secured best results with snap-on sun-glasses in which the lenses were changed as described below.

We took a pair of blue fitover (snap-on) sun-glasses and had an optician grind a red glass for one of the eyes. Assuming patient to be amblyopic in the right eye we inserted the red lens on the left side, the blue lens on the right. For very young children we secured some cartoons at the five and ten cent store and each week gave the child an assignment to trace as many pictures with red pencil as we supplied him. As the vision improved we not only increased the length of the assignments but changed the red pencil to a yellow one, the latter to stimulate vision of the poorer eye to its utmost.

In the case of older children, instead of the cartoons we have them copy assignments from books or write compositions of their own. With adults a similar procedure is followed.

Not the least important consideration in the use of this technique is the tremendous favorable psychologic reaction secured when a pair of

*Submitted for publication October 25, 1939.

these fitovers are snapped on over the patient's glasses and he is asked to write something with the red pencil. Perhaps for the first time in his life he suddenly discovers (closing one eye and then the other) that his vision has become excellent with his hitherto amblyopic or squinting eye. Again and again many of them will open and close first one eye and then the other finding it impossible to believe that they are now able to see better with their "bad eye" than with their "good eye."

The above technique is described in its barest skeleton form only, as each optometrist can readily work out details and modifications to suit himself. The point is that as an adjunct to other means in the home training of amblyopic and squint cases, we find the above to be a simple, inexpensive and invaluable aid.

DR. HARRIS GRUMAN
40 N. 8TH STREET
LEBANON, PA.

Current Comments by Carel C. Koch

Editor, American Journal of Optometry

Optometrists will confer a favor by sending for this department items of news of general interest; such as relate to new instruments, clinical techniques, education, public health and optometric legislation.

ON THE DISSEMINATION OF NEW TECHNICAL INFORMATION

One marvels at times at the obtuseness of certain groups of graduate optometrists, who at the bidding of self-appointed optometric educators, remold their practices to fit certain suggested specific therapies and refractive procedures. And all this is done, if you please, without having had presented to them, much if any acceptable technical evidence that the proposal, for which in most cases they have paid rather dearly, will work. And the writer is astonished, too, at the attitude of these somewhat fanatical optometrists, who having once joined such a cult, despite the fact that as a rule they can make neither head nor tail of the proposals, are most anxious to fight for their continuance. These men, frequently understanding but little if anything of the subject under discussion, are most desirous of seeing to it that outsiders too, understand nothing about it, and to insure this they assist in dressing up these novel ideas in esoteric language. Give the new technique a jargon of its own, and break away from plain every day refractive terms that every optometrist understands. Dress up the idea with symbols which are meaningless to the uninitiated, as well as most of those who pay out their good money to keep these itinerant educators in the field, and the success of the venture is assured. Success at least from the standpoint of membership enrollment.

Perhaps one receives the best criterion as to what happens in such a group by watching its leaders when they get, as they inevitably do, into genuine technical difficulties. Here we see them trying to make their own particular set of rules apply to every refractive contingency. An obvious impossibility. When opinion gets sufficiently confused all around, these resourceful educators, whose cupidity seems unending, can always add a few more mystic characters to the list and explain in their usual pompous manner, that new and important material is now being prepared and that this will shortly be given to the more advanced members. For, of course, an additional fee.

A day or two ago there reached the writer's desk a small optometrical leaflet. The writer assumes that this brochure serves the members of one of the several cults in optometry. It claims to be the one modern optometric development. Yet the ordinary optometrist can no more read it than he can read Gaelic. How long is it going to take some optometrists to understand that the real fundamental scientific developments in the health field do not come about in this manner? The true scientist and educator has a sincere desire to push back the frontiers of knowledge and is willing and eager to place the fruits of his labor before all men. He is anxious that this be done in as simple a manner as possible, so that all can understand. He is careful that the material contains not only the clinical claims he is advancing but also the technical background or theory upon which these claims are based, and in addition, whatever scientific facts there are to support his theory and clinical data.

This is always done, in sound professional circles, by presenting these findings and ideas to the profession for their critical attention, through the medium of the technical journals which serve the profession. Optometrists are then invited to add their studies and technical skills to that of the original research, and in this manner are developed the newer phases of our procedures. Dynamic skiametry; the correction of aniseikonia; many of our sub-normal visual aids, and numerous other developments in the correction of strabismus and the accommodative-convergence problems have come up through these legitimate channels to the genuine honor of the optometrists, who had a hand in their development. There was no secret made of these techniques. No one was asked to join anything. All the proponents asked was, that members of their profession give these newer developments a fair trial after giving the procedures the necessary study to familiarize themselves with the facts as then known. In this manner and only in this manner will the profession truly advance.

THE USE OF SLANG IN TECHNICAL PAPERS

The modern optometrist has had the advantage of education in a college or university, and certainly while there, he found his class work presented to him in a serious and impressive manner. Optometry is a dignified calling and the technical literature which accompanies the science of optometry should be written on such a plane as to preserve this dignity. The attitude of the optometric profession and of the public toward a scientific paper is largely dependent on the spirit with which

the paper is written. Slang has no place in the technical literature of optometry. Much of the dignity accruing to optometry today is dependent on the fact that optometrists have as a rule, presented their technical contributions in language suited to the subject. No editor worthy of the name cares to publish technical material dealing with serious refractive problems, when these are couched in a tone of levity or when these are filled with sentence after sentence of language which would disgrace the high-school sophomore. The following are examples taken from technical papers published in an optometric magazine. Each was written by a different optometrist and each paper dealt with an important ocular subject. These examples indicate without question that the language of the street is unsuited to the serious discussion of ocular and refractive problems.

> Now we again increase the base out prism bringing the targets closer again but before they overlap they again cross over. We can play horse in this manner for some time before the mind brings in a new manifestation. Just as though it gets tired of our fooling around, and as though it has not made it clear enough for our understanding, one target suddenly goes up and the other down.

The foregoing would be obviously much stronger and impressive if the "play horse" and the "fooling around" had been deleted by either the author or the editor of the publication in which all this appeared. If the author was just "fooling around," perhaps the reader, too, was just wasting his time in attempting to follow him. Let us now review another example of technical writing in which a sort of slang appears.

> . . . makes no claim to a "new optometry" but on the contrary is a champion of the old. Unlike the recent trend of so-called educators who are going up and down the land seeking to find how much of optometry may be destroyed, it simply builds on the elementary principles laid down by the forefathers of our profession.

This may be very true indeed, but it is still poor technical writing. In the scientific original papers of our profession, expressions similar to the foregoing have no place. The following is another exhibit of a "horrible example" of what an optometric author may perpetrate.

> Any fool can be a good acute diagnostician; that is to say what is wrong in any given instance after any malfunction has reached the acute stage and has become so obvious that any old lady who has raised a family can diagnose the case.

The author of the foregoing material had developed his thesis rather well but weakened his entire presentation by the inclusion of the kind of sentences just quoted. A similar example follows.

> That is what I and others have been doing for several years, and yet it is very difficult to get it before the optometric and medical profession, because it is unorthodox and not as taught 50 or 75 years ago. Neither did we travel by airplane that long ago; we traveled oxcart fashion. Optometry is going ahead. New techniques, new methods, new reasonings are coming out, but it is hard for the dyed-in-the-wool old timers and younger ones, who have been taught the old methods, to accept the new thoughts and ideas.

Technical papers which comprise the literature of a profession are written and published to be read. Anything which distracts from the grammatical purity of the subject matter itself should be discarded. Slang has no place in scientific writings and optometric authors, who are guilty of its use, do much toward lessening the ultimate effect of their writings.

EXAMINATION FINDINGS FROM PATIENTS OF DIFFERENT MENTAL TYPES

In a paper dealing with certain psychological aspects of refractive work, the optometrist, Swann, in the REFRACTIONIST, Vol. XXVIII, No. 502, p. 338, describes a personal and secret evaluation which he himself makes of each of his patients, presumably as he takes the case history. These classifications are made by Swann to assist him in developing the exact type of examination procedure which will best fit the patient then being examined. To carry out this idea Swann claims to have divided all patients in general, into four major groups. The first group is comprised of the very mentally alert. The second and third groups are comprised of those patients, who have in the judgment of the examiner Swann, mentalities of lesser degrees, and the fourth, those of very low mental attainments. The group or classification into which each patient falls is recorded in code on the record chart.

Swann claims that the first group are patients, who will, as a rule, react well to all subjective tests. In the second and third groups, he expects but little of value to develop from the subjective tests, particularly the monocular ones, and in the fourth group he entirely eliminates from his refractive routine the subjective tests as far as this is possible. In these latter cases the prescription is found by Swann objectively, and the subjective tests are applied only binocularly, to check, as far as this is possible, the findings obtained by the objective portion of the examination routine.

Swann does not give in detail his exact procedure in arriving at these rather arbitrary mental classifications of patients. His paper indicates

that these groupings are arrived at, in a sense, by combining the admitted educational background of the patient with that of his evident mental alertness and his manifested interest in the eye examination about to commence. All this is, of course, rather superficial, yet Swann claims the idea is helpful to him as it enables him to eliminate from certain examinations the rather lengthy and difficult subjective tests, which produce but little of value in cases in which the patient's mental reactions are at a low level.

VISUAL FIELD AND GLARE SENSITIVITY TESTS FOR MOTOR CAR DRIVERS

A group of 716 persons was given a series of visual tests by the oculist, Selling[1], at the Psychopathic Clinic of the Recorders Court in the City of Detroit. These persons were all traffic offenders and the tests were made in an effort to investigate relationships which might exist between ocular abnormalities and improper driving of motor cars. The work appears to have been done in an interesting and original manner by Selling, who developed several unusual techniques, which were used by him in certain portions of his examination routine.

It might be said at this point that Selling was in no way making what might be termed a motor vision survey. The subjects who were examined by him were apparently given a very complete ocular examination which attempted, as far as this was possible, to cover the following four aspects of vision. (1) The psychological aspect, in which the examiner, included a composition of tests dealing with visual sensation into perception and its modification by other psychologic functions such as mental disease, impaired judgment and improper attitude towards driving. (2) Refractive errors and imbalances of the extrinsic and intrinsic ocular muscles. (3) Organic disorders of retinal function, and (4) the physical aspect.

In addition to a general neurological and ocular examination, the following eye tests were made, these having to do particularly with the visual aspects of motor car driving. (1) Visual acuity. (2) Muscular balance. (3) Color vision. (4) Horizontal visual fields. (5) Glare sensitivity. (6) Ophthalmoscopic examination. (7) Depth perception. (8)

[1] Abnormalities of the eye and their significance in traffic court cases. Lowell S. Selling. Journal of the American Medical Association. Vol. 113, No. 11, pages 994-996. 1939.

Visual fatigue. (9) Judgment of speed, and (10) Judgment of distance.

Optometrists are quite familiar with the techniques used in making the foregoing tests as all of these are frequently used in either visual survey work or in routine refractive practice. Selling, however, modified to some degree the usual tests having to do with glare sensitivity and the horizontal visual fields and his methods of making these tests, the writer believes, will be of interest to optometrists everywhere.

Sensitivity to glare was tested by a special glarometer consisting of a large box divided in half by a screen of ground glass. The patient's eyes were fixed at a distance of 18 inches from the ground glass screen and he looked directly at it. A 300 watt lamp was placed in the half of the box behind the glass screen. This lamp was so adjusted as to position, that the luminosity of the entire 24 inch square of glass was equal. In the center, on the front of the ground glass screen, was placed a small card which had printed upon it a word, the letters of which were three-tenths of an inch in height. Selling estimated that these letters represented 20/60 vision, thus in part, eliminating error due to reasonable lack of visual acuity on the part of the person being examined. When the subject was in position before the glarometer, the light was turned on. He was at once subjected to an intensity of approximately 350 foot candles of light, which was then cut down in ten equipotent one second intervals to complete darkness. The subject reading the word on the small card as soon as he could. The examiner recording the finding at that interval in which the patient was first able to distinguish the letters on the card.

In this manner, Selling has made his glarometer tests on the photoreceptive visual mechanism. In most particulars, his techniques are somewhat similar to those used by optometrists, to test the relative speed of recovery of an eye after exposure to intense illumination, using for this purpose the clinical glarometers found in many refracting rooms throughout this country. In a certain sense, these tests as they are made today, are rather crude tests for light adaptation. Sellings' findings too, rather closely parallel the accepted findings usually found in making the speed of recovery from exposure to light tests. The question remains, however, is this a test for glare sensitivity?

Perhaps, it is as good as any clinical test yet devised, but in dealing with the subject of glare, it must be understood that the term glare itself has not as yet been well defined and it must be further kept in mind

that in making a test similar to the one just reviewed, there still exists some uncertainty as to the precise factors or components of vision which are being tested by means of this technique.

In plotting the visual fields of his subjects in the horizontal meridian, Selling constructed a large perimetric arc with a radius of one meter. This special perimeter had, aside from its size, the unique features that the arc was fixed for the horizontal meridian only and used as test objects, small colored automobile miniatures, which were made to move along a track on the arc itself. These small cars could be changed at will without the subject being aware of the change and in this manner the form as well as the color field could be ascertained, by having the subject describe the position and color of the miniature automobile test object seen in the field of indirect vision, while he watched a centrally located fixation point. This test was conducted under known and controlled illumination.

This test had, indeed, an appropriate technique, when one considers the general form of visual work being done at this clinic. The equipment used was of a character to clearly indicate to the subjects, the purpose of the test itself, and should have easily held their interest. The only possible criticism which might be offered regarding the technique is with reference to the relatively large size of the automobile test objects, which were used. These test objects would tend to reduce somewhat the number of persons, who would fail to pass a test conducted in this manner. The size of the test object used in perimetry has an important bearing on the size of both the form and color fields, as found as a result of the test and the test objects used by Selling would, it seems to the writer, have a tendency of making the examiner overlook minor abnormalities in the horizontal form and color fields.

It is interesting to observe that of the 716 subjects examined by Selling, that only five of these subjects were found to have a total horizontal visual field of less than 140 degrees. All five of these subjects presented other evidence of either general or ocular pathology. In these five, the fields showed marked constriction for both form and color: 39 of the subjects showed evidence of color blindness, which was later verified with the Ishihara color test. Selling has shown considerable originality in his work and it is hoped that he continues with his investigations, both extending and refining his techniques and tests. The start, he has made, is a good one and every encouragement should be given him to continue his research into these important visual problems.

ATKINSON DISCUSSES REFRACTION AND PHYSIO-THERAPY

The oculist, Atkinson, writing on refractive matters and physio-therapy, in the OPTOMETRIC WEEKLY, Vol. 30, No. 31, p. 863, 1939, suggests that optometrists make greater use of physical modalities of various kinds, particularly those in the immediate field of electrotherapy. He believes these measures have an important place in the treatment of ocular dysfunctions and feels also that optometrists because of their specialized training should logically turn, more and more, to this field of therapeutics to supplement their present orthoptic procedure. In this, Atkinson is following the already well defined trail that was blazed by the AMERICAN JOURNAL OF OPTOMETRY. Almost a score of years have passed since this journal introduced to the optometrical profession, various ocular techniques dealing with the use of high-frequency and diathermy. And during these ensuing years the journal has also placed in the hands of thousands of optometrists a background of technical information relative to the various forms of ocular physio-therapy upon which these readers could base further studies.

It is, therefore, naturally gratifying to us here in the journal's headquarters to note that an oculist, who possesses the unusual ability of Atkinson, has come forward to add the weight of his opinion, to the many previously published papers dealing with physio-therapy in the ocular field. Thomas G. Atkinson is Dean of the Pathology Department of the Northern Illinois Eye Clinic and is in a position to splendidly evaluate the clinical use of these modalities.

Atkinson's paper also touches on refractive techniques and various procedures employed by optometrists, and he here commits the error of assuming that the non-cycloplegic examination routines engaged in, for the most part by optometrists, are the result of certain optometrical statutory limitations. Such, however, is not the case. The underlying refractive theories which stand as a base for the eye examination techniques which have always been used by optometrists, were here first. The state legislative acts were later built around these theories, and in general, optometrists have no wish to change either their present position with reference to non-cycloplegic refractive techniques, nor the optometry acts which safguard the public and regulate the conduct of the profession.

To be sure, the last twenty or more years have seen a marked advancement in the examination techniques as used by optometrists. Instruments have improved, until today objective examination procedures have entirely eliminated the old time guess-work of the subjective test-chart era. In fact today, the entire technique of the modern optometrist bears but little resemblance to that of several decades ago. This is true in every particular but one. While there have been great changes in the methods and techniques employed by optometrists in making their examinations, one important optometric idea or theory has remained as a keystone in the arch of the profession, and that is this: It is unnecessary to use drugs in the examination of the eye. Optometrists, themselves, are not to be confused with "drugless healers." In fact, medicine and particularly that branch of medical science known as ophthalmology has no more loyal group of supporters than are the optometrists of today. That is evident from the close manner in which the two groups cooperate in the handling of patients, in whom optometrists have discovered some form of disease, or in whom they suspect of having incipient pathology, either general or ocular.

As the writer has said before, one predominating idea in the technical structure of the profession, when the first optometry act was passed 39 years ago, was, that satisfactory eye examinations could be made without resorting to the use of "drops" or, as they are more properly called, cycloplegics. Optometrists then, as now, did not believe that the routine use of cycloplegics in eye examining work was of value. Every scientific advancement that has been made in this field since this time has done much to strengthen this belief, and the recent scientific analysis of the use of cycloplegics, made in the physiological laboratories, supports this contention to the fullest degree. Thus, while in no way opposed to therapeutic measures, optometrists practice their refractive techniques without using cycloplegics to paralyze, or render ineffective, the action of the ciliary muscle while the refractive status of the eye was being investigated. Also, in their diagnostic work, optometrists for the most part, examine the interior of the eye without using mydriatics or dilate or enlarge the pupil. In both of these particulars, it was then and is now felt that other procedures accomplished the desired purpose in a more accurate manner and in one which resulted in less danger and inconvenience to the patient.

From the standpoint of the public, there has developed a very wide spread acceptance of these views. This is an outgrowth of the generally high standard of refractive work done by optometrists. Among oculists,

too, these non-cycloplegic refraction techniques, as used in the offices of optometrists, have found in many quarters, ready acceptance. This is true to such a large degree that today one finds many medical eye men using but few drugs in their refractive work. On the other hand, however, there are a group of oculists, who still cling to the use of cycloplegics and mydriatics when examining eyes. Among this group will be found those, who take the very extreme position that unless a drug is used, the quality of the work in some way suffers. This claim is made by this group, in spite of the fact that it has been completely proven that the use of the drug, homatropine, as a cycloplegic, does more to confuse the examiner than it does to assist him, and as homatropine is the drug usually employed to paralyze the ciliary muscle by those, who use the technique, we can entirely disregard their statements. The oculist Atkinson, however, despite his comments on refractive techniques, has performed a real service to all optometrists in again drawing to their attention the fact, that specific forms of physio-therapy will enable them to do more and better work in certain cases of ocular dysfunction.

FORMS OF OPTOMETRIC CENSURE

In that portion of his annual report which dealt with public relations, Dr. Leslie R. Burdette, President of the American Optometric Association, mentioned the fact that certain officials of the American Medical Association had completely denied having any participation, either official or otherwise, in the several so-called attacks which had been made upon optometry during the previous year. Just why he mentioned this fact was not made clear. Certainly, no one suspected them of taking part in such an activity.

While it is true that there is absolutely no evidence which indicates, in even the slightest degree whatsoever, that there is an organized effort on the part of any society of physicians, or collected group of oculists, to belittle the optometrist in the eyes of other professional people or before the public at large, the fact does remain, that from time to time, material is written and published which presents, either truthfully or in part, some of the shortcomings of the optometric group as a whole. Certain forms of criticism are, in the main, a good thing, for which we as optometrists should be thankful, yet some critical papers are written, without a doubt, as the result of a deliberate effort to injure the professional reputations of optometrists. These few latter papers, in the

writer's judgment, are individual efforts, rather than the result of collective action on the part of organized societies and should therefore be discounted as such.

Critical papers of all kinds fall into three general classifications. The first, and by far the largest group, consists of those papers which are written and published for professional optometric consumption only. This group of papers includes those manuscripts in which the author, either an optometrist, oculist, physician or educator, presents a conscientious effort to point out, what he believes to be a failing on the part of this profession, and also as a rule presents to his readers what he believes to be a remedy. These papers thus serving, in the long run, to improve the general tone of optometric practice.

The second group of papers consist of those manuscripts which are written for general professional consumption. Papers in which the subject matter has been so treated as to in some way affect the thinking of those professional readers who are not engaged in ocular work and who cannot therefore truly evaluate the sentiments expressed by the author. This group of technical or semi-technical papers are written, in part at least for their propaganda value, and these papers occasionally find their way into state medical journals, dental magazines or other professional publications dealing with health problems. These papers, which are sometimes more or less derogatory to optometry, are written as a rule by certain oculists, in the obvious and deliberate attempt to affect the attitude of other professional people towards those doing ocular work, in the hope of thus influencing them sufficiently to have them refer their patients, who are in need of an eye examination, to the oculist, rather than to the optometrist.

The third and numerically very small classification consists of papers which are apparently written in the deliberate attempt to influence the thinking of the lay public, with reference to ocular matters in general, and particularly in reference to their choice of specialists when having their eyes examined. These few latter papers are not written and published for professional consumption, but are rather written for the public at large, and a successful effort is now and then made to have these published in magazines which enjoy general circulation. These critical papers fall into the special classification of pure professional propaganda.

In reviewing the situation as a whole, one finds no evidence of an organized attack upon optometry by any group. In a profession as

numerically large as is the optometric one, certain criticisms are bound to arise and these should logically find expression in the technical journals reaching optometrists. This type of criticism is healthful to proper professional development, and already has done much to raise the standards of eye work throughout America.

Certain papers, however, falling chiefly in the second category, are not only unfair to optometrists and the profession they represent, but also contain statements which are false and which should never have been published. The recently printed letter by Juchhoff, which appeared in the correspondence section of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, Vol. 113, No. 9, page 876, 1939, is typical of this sort of silly and thoughtless writing. This author complains that in his judgment, optometry schools are teaching their undergraduate students to become physicians as well as eye specialists and that in the future these students will attempt to practice medicine as physicians, instead of practicing optometry as intended at present. Nothing of course could be farther from the truth, yet nonsense of this character tends to prejudice the general practitioner of medicine against the profession of optometry and all optometrists in general.

These papers were written, the writer suspects, not to improve any specific technique nor to add materially to our sum of knowledge, but rather to influence the thinking of general practitioners of medicine and to arouse in their minds, some question as to the ability of the average optometrist to properly perform his refractive and diagnostic work. The matter is of little moment, however, as these are but sporadic attacks and the fine job now being done by optometrists will refute any arguments to the contrary, advanced now or in the future, by those who for some reason do not approve of optometrists or the way they practice.

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A REVIEW OF CERTAIN OCULAR CASES IN WHICH ASTIGMATISM WAS IMPROPERLY CORRECTED*

Astigmatism is an ocular condition in which the refractive power of the eye is not equal in all meridians. This condition may result from a malcurvature of the corneal surfaces, or may result from a malcurvature of the surfaces of the crystalline lens. Both conditions may be present in the same case.

When astigmatism is present, rays of light, as refracted by the astigmatic eye, are brought to a focus in one meridian sooner than in the meridian at right angles to it. This condition is corrected by means of cylindrical lenses which will bring the rays of light to a foci on a common plane.

Astigmatism is usually divided into two classes. The first, and by far the most common, is known as regular astigmatism. Regular

*The third of a series of nine papers by Carel C. Koch, Opt.D., F.A.A.O., dealing with reported clinical findings. The fourth of this series will appear in the December issue of the AMERICAN JOURNAL OF OPTOMETRY.

corneal astigmatism is, in amount, the difference between the corneal curvatures of two meridians of the eye, the meridian of greatest curvature being for the most part opposite, or 90 degrees distant from the meridian of least curvature. Regular lenticular astigmatism is a condition in which the crystalline lens differs in curvature in various meridians, the meridian of greatest and least curvature again being at right angles to each other. In both corneal and lenticular astigmatism, the varying degrees of curvature between these two meridians are corrected by the varying degrees of power in the correcting cylinder. In other words, the cylinder which is used to correct astigmatism has a varying power from its axis to its meridian of greatest power, these being also at right angles to each other. Therefore, in correcting regular astigmatism, it is necessary for the examiner to concern himself with but these two meridians alone.

The second type of astigmatism is known as irregular astigmatism. Irregular corneal astigmatism usually results from some injury to the corneal surface, such as corneal ulcers, wounds, etc. It is generally uncorrectable by means of ordinary cylindrical lenses, but vision can at times be improved by these. Irregular lenticular astigmatism may be the result of an irregular accommodative action upon the crystalline lens. This abnormal accommodative action, exerted in an effort on the part of the eye itself, to correct, by means of its own refocusing mechanism, regular corneal astigmatism, which was either not corrected by means of proper cylindrical lenses or which had been corrected improperly by the use of cylindrical lenses of improper powers.

The symptoms of astigmatism are headaches and lowering of visual acuity. Improperly corrected astigmatism, or uncorrected astigmatism of low amount, usually results in headaches and a considerable amount of visual distress and it is obvious that astigmatism be most carefully corrected. Small differences in the power or axis of the correcting cylinder will make a great difference in the ultimate comfort received by the patient as the result of wearing the correction. Optometrists and oculists must therefore be particularly painstaking in their correction of astigmatism, and their refractive techniques must be so exacting and scientific that the resultant formula in every way properly relieves the condition by bringing into foci the rays of light from all meridians.

As the following reported cases will show, many oculists are apparently so busy with their ocular surgery and their ear, nose and throat work, that they tend to ignore the finer and more delicate refractive tests

which are necessary in the proper correction of astigmatism. Many of these men seem not really interested in ocular refraction and permit the pathological phases of eye, ear, nose and throat work to claim their attention. Many cases of improperly corrected astigmatism are seemingly due to this lack of interest, on the part of some oculists, in this end of their work.

That the need, however, for painstaking care in all refractive work exists, is generally recognized by all optometrists and most oculists, and great care is usually exercised by these men to give the patient the exact power and axis required in the cylindrical lens used to correct astigmatism. All optometrists and many oculists are also fortunate that their examination techniques are such that they can correct this condition without resorting to the use of cycloplegics or "drops" to assist them in making their refractions. As the writer has pointed out on several occasions[1,2,3], the use of drugs in an ocular examination frequently produces findings which are apt to confuse the examiner, inasmuch as the resultant action of the ciliary muscle, after homatropine is used in an eye examination is quite unpredictable. Oculists, who regularly use "drops" or cycloplegics in routine eye practice therefore seem to be very handicapped in arriving at the exact formula which will correct the refractive error, and these men, too, contribute to the number of improperly fitted refractive cases.

The following case reports further emphasize the unreliability of refractive findings taken when the eye is under the effect of drugs or when the work is done in a hurried or careless manner. These cases indicate, as much as clinical evidence can indicate anything, that the use of drugs in an ocular examination does not assist the examiner in correcting the amount of astigmatism present and indicate also the need for proper refractive techniques by which to diagnose the condition as well as to correct it. The following brief reviews of previously published cases, are but few, of the many that could have been included in this report. All have been taken from established sources of technical literature, and all were originally written by competent eye specialists.

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[1] An investigation as to the need for "drops" or cycloplegics in eye examinations. Carel C. Koch. American Journal of Optometry, Vol. 15, No. 1, pages 17-38, 1938.

[2] A review of certain ocular cases in which hyperopia was under-corrected. Carel C. Koch. American Journal of Optometry, Vol. 16, No. 9, pages 349-361, 1939.

[3] A review of certain ocular cases in which myopia was over-corrected or in which pseudo-myopia was improperly diagnosed as myopia. Carel C. Koch. American Journal of Optometry, Vol. 16, No. 10, pages 387-396, 1939.

CASE REPORT No. 37

Ryer reports the following case in OPHTHALMOMETRY, 1925, page 211. Patient, male, age 50. The following correction, which was prescribed by an oculist, was not satisfactory.

O.D. —0.75 D. Sph. ⌒ —1.25 D. Cyl. axis 105
O.S. —1.00 D. Sph. ⌒ —0.50 D. Cyl. axis 180

The optometrist, Ryer, in examining the case, found the astigmatism to be improperly corrected and with the aid of the following correction gave the patient complete comfort.

O.D. —0.25 D. Sph. ⌒ —2.00 D. Cyl. axis 95
O.S. —1.00 D. Sph. ⌒ —0.25 D. Cyl. axis 90

CASE REPORT No. 38

Jones reports the following case in the OPTICIAN, Vol. XCV, No. 2459, page 268. Patient, a housewife, suffering from poor vision. The optometrist, Jones, examined the patient and prescribed the following correction, which she used for several years with comfort.

O.D. —4.50 D. Cyl. axis 180
O.S. —5.00 D. Cyl. axis 180

She then returned with a friend guiding her and said she had "gone quite blind" and could not use her glasses. She had worried for over a week and could not sleep. She had consulted an oculist, who had told her that her case was a very bad one, that necessitated an operation which could be done at the Bangor Infirmary, some fifty miles from her home.

She was then still more worried and alarmed but she told the oculist that as the optometrist, Jones, had given her so much satisfaction at the start of her experiences with eye men, that she would first consult Jones again before having the operation performed.

Jones examined the patient and the findings were negative. He next examined her glasses and found that the right lens, which was round, had turned in the frame so that the axis of the cylinder was vertical instead of horizontal. Upon turning the lens back to its proper position her vision at once became normal. The patient thought that Jones had performed a miracle and was very grateful for saving her the expense and annoyance of an unnecessary operation.

CASE REPORT No. 39

Gruman reports the following case in the OPTICAL JOURNAL AND REVIEW OF OPTOMETRY, Vol. LXXVI, No. 7, page 17. Patient, male, had applied for a job in a steel plant and the plant examiner had referred

him to the company oculist for a visual test. The oculist prescribed the following astigmatic correction which, when used, gave the patient a visual acuity of but 20/50 O.U.

O.D. —0.75 D. Sph. ⌒ +1.25 D. Cyl. axis 180
O. S. —0.75 D. Sph. ⌒ +1.25 D. Cyl. axis 180

The optometrist, Gruman, examined the patient and found that without glasses his visual acuity was 20/20 or normal in the right eye, and 20/30 in the left. There was no astigmatism present.

CASE REPORT No. 40

Sandall reports the following case in the OPTICIAN, Vol. XCIV, No. 2426, page 124. Patient, male, suffering from some visual discomfort. An oculist examined him and prescribed the following correction.

O.D. +1.00 D. Sph.
O.S. +1.00 D. Sph.
Add, O.U. +1.50 D. Sph. in bifocal form.

The optometrist, Sandall, examined the patient and prescribed the following correction which gave the patient visual comfort.

O.D. +0.25 D. Sph. ⌒ +0.75 D. Cyl. axis 30
O.S. +0.25 D. Sph. ⌒ +0.75 D. Cyl. axis 160
Add, O.U. +1.50 D. Sph., in bifocal form.

CASE REPORT No. 41

Simpson reports the following case in the AMERICAN JOURNAL OF OPTOMETRY, Vol. 15, No. 7, page 270. Patient, female, age 20. Has used glasses for past fifteen years. Prescribed by an oculist, who had informed her that her left eye had never developed. Visual acuity in left eye was light perception only, at ten feet. The optometrist, Simpson, examined the case and made a diagnosis of amblyopia ex anopsia, due to uncorrected astigmatism, and prescribed orthoptic treatment for the left eye, as well as a temporary treatment correction. At the end of the treatment period the vision of the left eye, with the following correction, was 20/20—, and the patient enjoyed single binocular vision.

O.S. —2.50 D. Sph. ⌒ +5.50 D. Cyl. axis 85.

CASE REPORT No. 42

Humphriss reports the following case in the OPTICIAN, Vol. XCVI, No. 2494, page 419. Patient, female, age 56. Called on the optometrist, Humphriss, because she had heard that he had had success with unusual cases. She was wearing a plus sphere for reading, the correction assisting her right eye only, as an oculist, who had prescribed

the correction, told her that nothing could be done for the left eye. Humphriss examined the patient and found a high degree of astigmatism present. He first prescribed a partial treatment correction and then orthoptic treatments to stimulate the visual centers of the left eye. Within six months the patient had the following final correction which gave complete comfort, and a visual acuity in the left eye of 6/12.

O.D. +1.50 D. Sph.
O.S. +5.00 D. Sph. ⊂ —4.00 D. Cyl. axis 30.

CASE REPORT No. 43

Ryer reports the following case in OPHTHALMOMETRY, 1925, pages 182-183. Patient, boy, age 9. The following correction had been prescribed by an oculist, using atropine, and because the use of these "drops" had caused a high fever and other alarming symptoms, his parents objected to that method of examination procedure. The correction was:

O.D. +3.00 D. Sph. ⊂ +0.50 D. Cyl. axis 90
O.S. +1.00 D. Sph. ⊂ +0.50 D. Cyl. axis 90

The optometrist, Ryer, finding the right eye somewhat amblyopic, prescribed the following corrections, the first for general wear and the second for treatment use one hour each day.

General purpose correction:

O.D. +3.50 D. Sph. ⊂ +1.00 D. Cyl. axis 90
O.S. +1.00 D. Sph. ⊂ +0.50 D. Cyl. axis 90

Treatment correction:

O.D. +4.50 D. Sph. ⊂ +1.25 D. Cyl. axis 90
O.S. Plano-Frosted Amber.

CASE REPORT No. 44

Kurtz reports the following case in the NORTHWEST JOURNAL OF OPTOMETRY, Vol. 1, No. 10, page 205. Patient, female, age 31. Patient complained of poor vision, photophobia and diplopia when first seen. She had been refracted by an oculist, who had employed a cycloplegic. This examiner had prescribed as follows:

O.D. +1.00 D. Cyl. axis 180
O.S. +4.00 D. Cyl. axis 135

With this correction in place the patient's visual acuity was O.D. 20/200. O.S. 20/200. The optometrist, Kurtz, prescribed the following correction which gave relief from the symptoms and which was worn constantly with comfort.

O.D. —9.00 D. Sph.
O.S. —7.50 D. Sph. ⌒ +3.50 D. Cyl. axis 75.

CASE REPORT No. 45

Coates reports the following case in the OPTICIAN, Vol. XCVI, No. 2482, page 199. Patient, housewife. Was wearing the following correction that had been prescribed by a country doctor. Claimed they made her eyes feel bad.

O.D. +1.75 D. Sph. ⌒ —1.75 D. Cyl. axis 180
O.S. +1.75 D. Sph. ⌒ —1.75 D. Cyl. axis 80
Addition in bifocal form, OU. +4.00 D. Sph.

The optometrist, Coates, examined the case and found that the astigmatism had been greatly over-corrected and prescribed the following correction which gave complete comfort.

O.D. +0.25 D. Sph. ⌒ —0.50 D. Cyl. axis 45
O.S. +0.25 D. Sph. ⌒ —0.50 D. Cyl. axis 120
Addition in bifocal form, O.U. +2.50 D. Sph.

CASE REPORT No. 46

Morse-Peckham reports the following case in the CLINICAL REPORT OF THE OPTOMETRIC RESEARCH INSTITUTE, No. 5, page 33, 1938. Patient, boy, age 8. Experiences some difficulty wearing the following correction which was prescribed by an oculist under homatropine.

O.D. +3.50 D. Sph. ⌒ +0.50 D. Cyl. axis 90
O.S. +4.00 D. Sph. ⌒ +1.00 D. Cyl. axis 90

The optometrist, Morse-Peckham, found the astigmatism to be improperly corrected and by means of the following correction gave the patient complete comfort.

O.D. +3.25 D. Sph. ⌒ +1.75 D. Cyl. axis 120
O.S. +3.00 D. Sph. ⌒ +1.00 D. Cyl. axis 105.

CASE REPORT No. 47

Kurtz reports the following case in the AMERICAN JOURNAL OF OPTOMETRY, Vol. 4, No. 1, page 16. Patient, boy, age 16. High school student. Complains of headaches and pain in eyes when used for near work. The glasses he had, were prescribed by an oculist under a cycloplegic and the patient claimed they did not help him but in fact made matters worse. These glasses were

O.D. —0.50 D. Cyl. axis 90
O.S. —0.75 D. Cyl. axis 90

After an examination, the optometrist, Kurtz, prescribed the following correction which gave immediate relief and which was used for a considerable period of time with complete comfort.

O.D. +1.00 D. Sph.
O.S. +1.00 D. Sph.

CASE REPORT No. 48

Swann reports the following case in the OPTICIAN, Vol. LXXXIV, No. 2177, page 295. Patient, male, age 44. His oculist had prescribed the following correction for his astigmatism which he could not use.

O.D. +0.25 D. Sph. ⊂ —1.50 D. Cyl. axis 105
O.S. +0.50 D. Sph. ⊂ —2.00 D. Cyl. axis 60

The optometrist, Swann, examined the patient and prescribed the following correction which gave the patient complete comfort.

O.D. —2.50 D. Cyl. axis 110
O.S. +0.25 D. Sph. ⊂ —3.00 D. Cyl. axis 60.

CASE REPORT No. 49

Peckham reports the following case in the AMERICAN JOURNAL OF OPTOMETRY, Vol. 2, No. 9, page 269. Patient, male, had been suffering from headache and nervous exhaustion for several years. Had consulted an oculist, who had prescribed the following correction, which gave no relief.

O.D. +2.00 D. Cyl. axis 90
O.S. +0.75 D. Cyl. axis 90

The optometrist, Peckham, examined the case which he found to be esophoric in a considerable amount. He prescribed orthoptic treatments and the following two corrections, which gave immediate relief.

Distance correction:
O.D. +1.00 D. Sph. ⊂ —2.75 D. Cyl. axis 180
O.S. +1.00 D. Sph. ⊂ —2.75 D. Cyl. axis 180
Reading correction:
O.D. +1.00 D. Sph. ⊂ +1.50 D. Cyl. axis 90
O.S. +1.00 D. Sph. ⊂ +1.50 D. Cyl. axis 90.

CASE REPORT No. 50

Caledonian reports the following case in the OPTICIAN, Vol. LXXXI, No. 2089, page 136. Patient, male, consulted an oculist, who prescribed the following correction, which the patient could not use. The glasses were given the patient for reading only.

O.D. +1.00 D. Sph. ⊂ +2.00 D. Cyl. axis 120
O.S. —4.00 D. Cyl. axis 150.

The optometrist then examined the case and gave the patient the following corrections, which enabled the patient to conduct his affairs in comfort

Distance correction:
O.D. +1.00 D. Sph. ⌒ —5.00 D. Cyl. axis 25
O.S. —2.00 D. Sph. ⌒ —5.00 D. Cyl. axis 150.

Reading correction:
O.D. +4.00 D. Sph. ⌒ —5.00 D. Cyl. axis 25
O.S. +1.00 D. Sph. ⌒ —5.00 D. Cyl. axis 150.

CASE REPORT No. 51

Peckham reports the following case in the AMERICAN JOURNAL OF OPTOMETRY, Vol. 4, No. 4, page 111. Patient, female, age 28 at time of first consultation with Peckham. She had suffered for years from the most dreadful sick-headaches which came on at intervals of from six to eight weeks. She would be forced to go to bed for three or four days. Extreme nausea, vomiting, loathing of food always accompanied these attacks. Physician after physician was consulted but no relief found. The optometrist, Peckham, found as a result of his examination considerable esophoria at distance with a convergence insufficiency at the reading distance. This patient had worn glasses for the past fifteen years, and had copies of all of her prescriptions. Some were for weak concave lenses, some for weak convex, some called for astigmatic corrections, some omitted them. Peckham found a high degree of corneal astigmatism, masked by the convergence-accommodative effort. Vision was considerably above normal. After suppressing the convergence, Peckham could prescribe the full correction for the astigmatism and also uncovered a high amount of latent hyperopia. Correction of this error of refraction brought relief, and in this case no further medical treatment was necessary

Summary

During the past decade, "drops" or cycloplegics seem to have become the mainstay of refraction in the offices of some few oculists. It seems to be their belief, that if "drops" can be instilled into the eyes of their patients, that all of their refractive problems will be easily solved. As some of the preceding cases of improperly corrected astigmatism show, such is not the case, even when the original examinations were made while the eyes were under the influence of drugs.

Other of these cases show improperly prescribed corrections for astigmatism, due under all probability to the examiner's interest lying elsewhere. Ocular refractions cannot successfully be made by persons whose interest covers too wide a field. The many technical problems involved in successful refractive practice make it necessary for the examiner to devote a major portion of his time to refractions, if these are to be done at all well. The foregoing cases were originally all refracted by practicing physicians or oculists, most of whom were presumably engaged in eye, ear, nose and throat work. In every case, errors were made which ultimately were corrected by optometrists. These cases indicate that medical training on the part of the refractionist does not assure the patient a successful refraction, and they also indicate that the use of "drops" or cycloplegics in astigmatic cases does not assure the patient necessary visual comfort.

Conclusions

1. The cases reviewed in this report indicate that the average physician or oculist is none too skilled as a refractionist, particularly when it comes to correcting difficult cases of astigmatism.

2. The cases reviewed in this report indicate that the use of "drops" or cycloplegics in cases of astigmatism in no way assures the accuracy of the final formula prescribed.

3. The cases reviewed in this report indicate that optometrists, when using their regular examination techniques, are able to properly prescribe for cases of astigmatism.

CAREL C. KOCH.

PROCEDURE AND INSTRUMENTATION

By Guy L. DuPlessis

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work will be subjected to some critical evaluation.

"VADE MECUM"

Beginning with this issue and every issue thereafter, the writer presents a new department entitled, "Procedure and Instrumentation." With the introduction of this new department, it is fitting to define its scope. "Procedure" refers to refractive or orthoptic methods, both clinical and experimental, which are of particular interest to optometrists. Some of these procedures may be novel to the reader, others commonplace. At times, these pages will refer to only employment of equipment now in common usage. "Instrumentation" will refer generally to the means of applying these procedures and also to equipment recently offered to the optometric profession. In the case of instrumentation as well as procedure, mention may be made of equipment or instruments only remotely connected with clinical practice, but the fact that this equipment concerns visual processes in one way or another will justify its appearance in these pages.

In discussing "Procedure and Instrumentation," the following points will be kept in mind whenever possible:

1. The theory of use, or the principle invoked to justify its usage.
2. The validity of these principles or theories.
3. The determination of whether or not said procedure or instrument complies with or follows the theory or principles invoked.
4. The mechanical construction of the device and its manner of use.

It is fully realized that such a review or appraisal will give rise to disagreement and if this disagreement is based on valid considerations, it will receive due acknowledgment in these pages. The practicability of the instrument will not necessarily be invoked, as that is a matter for the user to decide. More important is the conformity of the instrument

with the principles invoked and the effectiveness of the procedure in accomplishing what is claimed for it. It should be noted that an exposition in these pages does not constitute a validation of claim. Unless otherwise stated by reference or quotation, these views are the personal views of the writer. Neither commendation nor criticism are to be construed as indorsement or disapproval, but rather as the personal opinion of a practicing optometrist. G. L. DuP.

THE LUCKIESH-MOSS VISIBILITY METER

This device of simple and compact construction is of interest to optometrists because it attempts to reconcile illumination to visual principles, which to my knowledge has defied practical association up to the present. As pointed out by the inventors, in their article, "Visibility—Its Measurement and Significance In Seeing," JOURNAL OF THE FRANKLIN INSTITUTE, visibility consists of a number of variables of which the most obvious are size and brightness of object. The size refers to the angle subtended by the object and that in turn is a variable depending on the retinal spacing of the rods and cones. The threshold of form acuity therefore, involves critical perception of detail and this is only partly met in our clinical acuity tests. Brightness presents another factor, there being a luminosity threshold beyond which an object of given size cannot be seen. The Luckiesh-Moss visibility meter attempts to determine this threshold for various sizes of objects, so that visual tasks requiring more critical perception of detail require a corresponding increase in illumination.

This is done by employing two neutral wedges which rotate before the eyes as they binocularly fix upon the object. On the instrument are two scales which follow the rotation of these wedges. The scales are calibrated under an illumination of 10 foot-candles, so that the test object of threshold visibility for an observer possessing average normal vision registers as unity. Relative visibility of "3" signifies that, the visibility of the object is equal to that of a standard test object subtending 3 minutes under an illumination of 10 foot-candles.

According to the inventors, if the illumination prevalent at the time of observation differs from that of calibration, the visibility also differs proportionately. They therefore have incorporated a second scale on the instrument to denote a suggested illumination for comfortable

seeing, but as that scale is calibrated from the visibility scale under 10 foot-candles it is necessary to correct this second scale reading by multiplying or dividing, depending on the relative visibility found. This instrument can be calibrated for indoor or outdoor use. It is claimed by the inventors that its purposes are many fold, for instance, analysis of illumination for tasks requiring close discrimination of detail, highway lighting, etc.

No mention is made in their article of a possible optometric use for The Visibility Meter, though undoubtedly the principles involved offer possibilities for further investigation. The writer does not feel qualified to present a critical analysis of the physiological factors involved, as Luckiesh and Moss are quite widely considered authorities in their field.

However, there appears to be several minor objections to the device. These are as follows: (1) The instrument is calibrated under an illumination of 10 foot-candles. Observations frequently are made under various degrees of illumination. Not knowing the form threshold of the observer, the finding to be of value, should also incorporate in foot-candles the illumination of the object observed and while brightness contrast of the object would appear to affect the visibility, the authors assure us that the measurements are independent of the contrast characteristics of the object. (2) Another objection is that the wedges used in the instrument appear to introduce a visual error, perhaps best described as increasing confusion circles as the density of the wedge increases. The writer does not know the explanation of this unless it be in the construction of the wedge itself, but this seems to introduce a variable in visibility for which apparently no provision has been made. Mechanically, the instrument is simple and well built and is not overly expensive. Its validity rests on the claims of the inventors and on the calibrations they have given the device. To judge these claims, it is necessary to do certain research beyond the scope of this department. However, this may be done by others and published in this Journal at a later date.

CORRESPONDENCE

THE USE OF DRUGS IN EYE EXAMINATIONS

To the Editor: I read with considerable interest your account of the cases in which hyperopia was undercorrected following the use of cycloplegia. There can be no possible doubt that much of the faulty refraction which comes from the hands of medical men is due to the use of drugs. The rest is probably due to a lack of knowledge of elementary optical principles.

I have long experimented with cycloplegics and indeed make frequent use of them, but almost invariably the experience is somewhat as follows. The patient on being refracted under their influence shows more plus than without, but if well-known optometric methods are employed it is possible to make the error more fully manifest. Hence it would appear that there is never much to be gained by the use of such drugs.

The eye under the influence of a drug is not a normal eye, nor are the findings related to the functional faults of that eye, and it is these functional faults that we are called upon to correct. To prescribe from the cycloplegic finding without any regard to the problems of binocular balance is folly unworthy of anyone who makes any pretence of scientific accuracy.

Considerable interest has lately been given to the refractive work of the late Graf Wiser, M.D., of Bad Eilsen, who did so many remarkable things with cases that had been given up by other medical men, and it is important to note that not only did Graf Wiser not use drugs in his special methods of refraction but he condemned their use for that purpose. Support is given to the value of his own work by the fact that those refractionists who have incorporated his methods in their own techniques have been able to do what he did.

Atropine is probably the most powerful cycloplegic known to us, and although it may loosen the accommodative-convergence relationship it seldom permits us to give a correction, in such conditions as strabismus, which cannot be improved upon. Commonly the effect is to permit a little more plus to be accepted, but it is only when due and proper treatment directed to the faulty convergence is undertaken that the ciliary will

give up the error which it is hiding. Continued experience of this particular aspect of the problem of hyperopia forces one to accept the clinical fact that the true source of latent error is to be found in the convergence, and it is only by paying attention to this that any worthwhile revelation of latent error is possible. The individual eye is not complete in itself but is an integral part of the binocular make-up and any procedure which neglects this fundamental basis of operation reveals its own lack of completeness.

Research into the question of the correction of hyperopia has been neglected by the medical world, and it is only when we come to the activities of the optometrist that we find any true comprehension of its problems. Nowhere is the superiority of the optometrist shown as in this for he is the only person who can make any valid claim to have studied the matter from the proper angle.

It is sometimes said by medical critics of optometry that the optometrist has learned whatever he knows from dipping into medical textbooks on refraction. As I write this, I have before me a copy of Landolt's great work on *"The Refraction and Accommodation of the Eye."* It is a truly remarkable volume published in 1886, yet the latest medical work on refraction which my library contains has no further information to give me than has this book. On the other hand the progress which the optometrist has made is shown in the number of books embodying special techniques which have been published by optometrists for optometrists. And so we could go on.

Perhaps the day will come when the visual needs of humanity will be served by those who are best able to deal with them. The definite superiority of the optometrist in this work marks him out as the one who can best perform this office.

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INQUIRY AND EXPLANATORY NOTES

Through this department answers to technical questions dealing with orthoptic or refractive problems will be presented. These answers here published have been prepared by competent experts. Inquiries on postal cards and anonymous communications will not be noticed.

MEDICINAL TREATMENT OF CATARACTS

To the Editor: A patient has been advised by a local physician to undergo a series of ocular medicinal treatments for incipient senile cataract. Have you information regarding this type of medicinal treatment?

J. S., Philadelphia, Pa.

Answer: In 1933, a committee under the chairmanship of Dr. A. Greenwood of Boston, reported to the American Academy of Ophthalmology and Oto-Laryngology on its investigation of the medicinal treatment of incipient cataract. In substance, the report indicated that the committee failed to find any satisfactory clinical or scientific evidence that the medicinal treatment of lenticular opacities will cause a restoration of the normal transparency of the crystalline lens. As far as is generally known, the period since 1933 has developed nothing of therapeutic value to assist patients suffering from this form of cataract.

ABSTRACT

THE GRAF WISER TREATMENT OF MYOPIA. H. B. Marton. The Optician, Vol. XCVIII, No. 2530, 117-119, and Vol. XCVIII, No. 2532, 147-149. 1939.

The name Graf Wiser has appeared of late in papers dealing with ocular matters, particularly those in which myopia was mentioned. Graf Wiser, who died a short time ago, was an oculist who practiced in Bad Eilsen, Germany. Apparently this man had a huge ocular practice, patients coming to him from all parts of the continent. Not only was his practice large, but his methods were unique, particularly when measured from the standpoint of generally accepted techniques.

The optometrist Marton, whose practice is in England, has studied

the theories of Graf Miser, and has had the unique experience of continuing the Graf Wiser therapies, with a group of some twenty or more English patients, who had been under the care of the German specialist and who wished to continue these special treatment measures at home. In this manner has Marton become acquainted with the work and it is with this background of experience that he has prepared the paper which is now being reviewed.

According to Marton, it must be understood that the Graf Wiser techniques were not confined to ametropia alone but embraced the gamut of all ocular conditions, and while general lines were laid down upon which all cases were treated, it must be understood that each case was given specialized attention and that particular type of treatment, that was assumed to be best for that case. The main feature of this therapy was that plus lenses and prisms were used to the complete exclusion of concave lenses and that astigmatism was seldom given a specific correction.

Graf Miser is best known for his treatment of myopia. He believed that a ciliary spasm played an important role in the development of this condition. According to Marton, he felt that most myopes were actually hyperopic but owing to the cramp of the ciliary muscle the eye acquired more or less myopia and as this developed the eye suffered from malnutrition which in turn brought about a slackening of the tissues of the eye thus producing an elongation of the eye itself. Graf Wiser claimed that almost every case of myopia was of this nature, and the use of concave lenses served to establish or "fix" the condition and increase the amount of myopia which was present. Believing this he used no concave lenses.

His problem then became that of determining just how much hyperopia was present at the start, as well as the degree of acquired myopia then present. In this he found subjective examination techniques to be of greater value than objective. His technique was then to encourage relaxation of the ciliary muscle by having the patient view the Snellen test types for long periods of time. As this was done it was frequently possible for patients to read characters much farther down the chart than those seen when the chart was first viewed. This is continued until the patient could advance no further. Then weak plus spheres were placed before the patient's eyes. This naturally blurred vision and the patient was again urged to view the chart and read as many characters as possible. In time, it is claimed, vision again improved, thus proving that some relaxation had occurred.

At no time it must be understood were concave lenses used. Patients were treated with convex lenses and wore these constantly, irrespective of visual acuity. Marton illustrates this with a case of myopia of ten diopters who was wearing a pair of +1.50 D. spheres, with a resultant visual acuity of 1/18. Base-in prisms were also frequently employed, and were used for both treatment purposes and in distance corrections.

In prescribing for near work, Marton claims that separate corrections were usually employed. These formulas were arrived at in the following manner. The tests were for the most part subjective. The patient viewed Jaeger near-point test types. The far point was found and then weak plus spheres were applied. Spheres of such degree that with the exercise of relaxation clarity of the types was maintained. Base-in prisms were employed here also, and an effort was made to give the patient as much plus sphere as possible. Marton emphasizes the fact that at no time were concave lenses prescribed for these cases, and adds that his own experience with this method of treating myopes has not been sufficient to enable him to enunciate a full set of rules for the application of these techniques. Because of the results obtained in certain cases of moderate amounts of myopia he maintained an open mind relative to the techniques suggested.

Marton also points out the fact that some of the patients who have been treated at the Bad Eilsen Clinic are using very high power plus spheres for near work. In one case a patient had been using a +35.00 D. sphere. Naturally in viewing anything through a lens of this character the material must be held very close to the eye. The natural tendency would be to withdraw it somewhat and in the effort to do this and still see with some degree of clarity the ciliary muscle would be forced to relax. The entire technique has had this for a purpose and once the patient has been convinced that this form of therapy will be of assistance, they seem perfectly willing to undergo some discomfort to attempt a cure.

Marton concludes his paper with a note of warning. He claims that it is most undesirable that anything be done which would create yet another school of refraction or therapy within the ranks of optometrists. He refers to the fact that we already have in optometry examples of the baneful effect of this in various departments of our work. He further emphasizes the fact that the claims for the therapies which have been outlined have yet to be proved and they do not in any particular represent an established technique. And he adds that he has maintained an interest in them simply on the grounds that in any scientific subject the final

word can never be said, and therefore it is possible that in the obviously restricted field of their service the unique techniques of Graf Wiser may have something to teach us all. T. O. B.

* * * * *

BOOK NOTICES

PATIENT CONTROL. Harry E. Pine, D.O.S. Published by the Professional Press. 5 North Wabash Ave., Chicago, Ill. 64 pages. Illustrated. Board covers. $1. 1939.

This monograph by Pine deals with the psychological approach necessary in the proper handling of patients. The author touches on the office layout essential for good examination techniques, and dwells briefly on those non-refractive, but yet important professional requirements which should be cultivated by every practitioner of the healing arts. The book is especially written for optometrists and many of Pine's ideas will find ready acceptance by members of this profession.

T. O. B.

* * * * *

PRIMER OF ALLERGY. Warren T. Vaughan, M.D. Published by the C. V. Mosby Company. 3525 Pine Blvd., St. Louis, Mo. 140 pages. Illustrated. $1.50. 1939.

The author of this handbook on allergy has had extensive experience in treating patients, who were suffering from one or another forms of this condition. This guidebook is written to assist the patient in understanding some of the problems which confront both the physician and the patient when the involvement is present. The volume explains in simple terms the type of changes which seem to occur when one becomes allergic or develops the idiosyncrasies which accompany the malady and also tells how much to expect in way of relief from the treatment, as well as how to guard against a return of the symptoms.

T. O. B.

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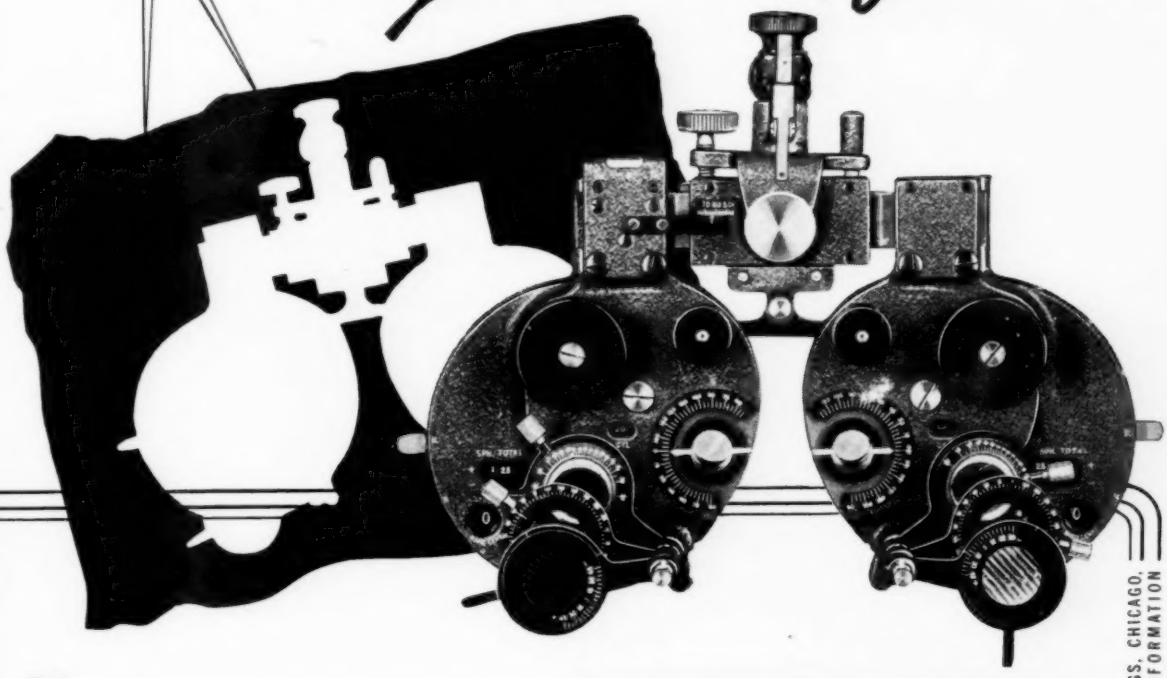

You appreciate smooth operating, accurate, intelligently designed ophthalmic equipment. That is why we are sure that if you use a Greens' in your office you will soon be calling it your best assistant. Check this list and see if your present refractive technique or instrument has these advantages, which are just a few of the superiorities of the B&L Greens'.

- ☐ Vertex refraction—no compensation necessary, regardless of lens powers.
- ☐ Cylinders may be set at any axis.
- ☐ Cross cylinder solidly supported, making accurate control.
- ☐ Spherical powers from + 19.87 to − 28.00.
- ☐ Cylinder powers from 0 to 7.50 diopters.
- ☐ Unusual speed and ease in operation.
- ☐ Appearance that inspires confidence and prestige.

We'd like to show you how you can use a Greens' profitably. May we make a demonstration soon? Just speak to your Riggs Representative or fill in the coupon at the right.

RIGGS OPTICAL COMPANY

Distributors of Bausch & Lomb Products

JUST WRITE YOUR NAME AND ADDRESS IN THE MARGIN AND SEND TO RIGGS, CHICAGO, AND WE'LL ☐ ARRANGE A DEMONSTRATION OR ☐ SEND COMPLETE INFORMATION

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Specify WIDESITES

Eliminate all doubt in your patients' minds by telling them that you use only *Shuron WIDESITES.* Explain that they are lenses of the highest quality—that there is no better lens than a Shuron WIDESITE. *Result*—a satisfied patient who knows she's wearing the finest lenses obtainable anywhere.

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